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1.0 – INTRODUCTION

We congratulate you on purchasing a Baiteck- made inverse osmosis Water-maker and on choosing the quality and the reliability of SYNCHROLIGHT. SYNCHROLIGHT is manufactured with high-quality selected components in a wholly bright steel structure, it has a completely automatic running, it will give you an optimal fresh water from the water of sea.

Thanks to its extremely compact size, it will take up a very small space onboard. The SYNCHROLIGHT, is easy and fast to install, solves all fresh water problems onboard.

This manual contains the whole instructions for installation, maintenance and the correct management in order to get the best performance of the water-maker.

Our range of products is developed in order to meet quality and running high standards, therefore we suggest the end-user to buy only pure spare parts and materials, available in our authorized retailers

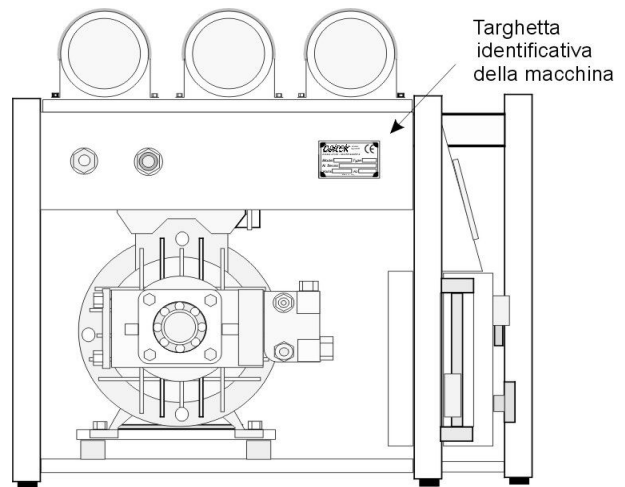
2.0 - PACKAGING AND PLATE

The SYNCHROLIGHT watermaker is packed and sent in a wood crate.

Dimension: 850 x 600 x 550 (L x P x H)

Volume: 0,30 mc.

Weight: 70 Kg



3.0 - - **WATER TYPOLOGY**

The water is a mixture of a two elements: hydrogen and oxygen. It is never a pure element, there are always some substances that render the water “unique” in some way.

The sea water contains a high quantity of sodium chloride (NaCl), but its composition is extremely varied and variable. Generally speaking we can say that there are different nature salts and organic substances in sea water.

SYNCHROLIGHT has been developed in order to work and supply fresh-water, in whichever saltiness condition and composition of sea-water, in close docks (such as the Mediterranean Sea where there is a purer saltiness), open sea or brackish water (such as river mouths).

4.0 - WORKING PRINCIPLES

4.1 – Reverse osmosis

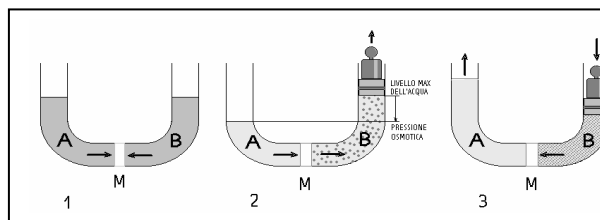
The functioning of the SYNCHROLIGHT Watermaker is based on the osmosis principle.

The inverse osmosis is the best one between the treatment of the water, above all for the purifying and desalination processes.

The **osmosis** one is a natural process that happens in all the biological system, is the spontaneous passage of a pure dissolvent towards one more concentrated solution, through a **semi-permeable** membrane.

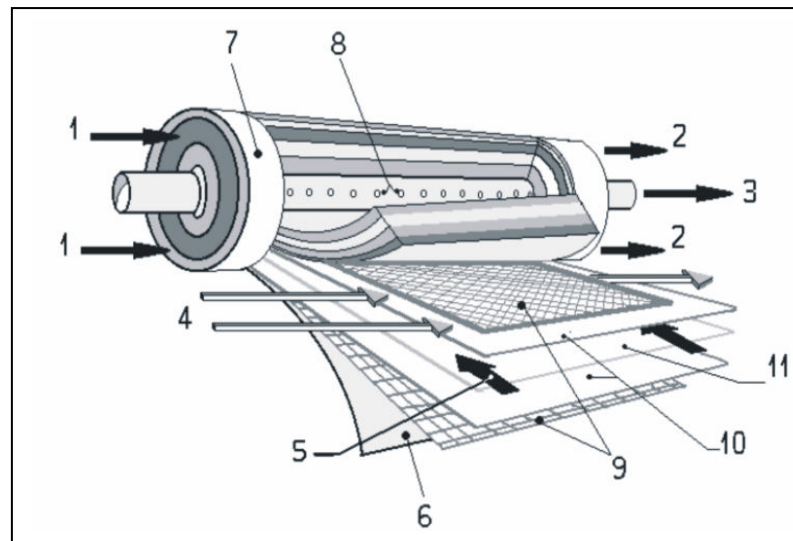
During the **inverse osmosis**, the natural direction of the flow comes turned upside down applying a pressure on the more concentrated solution. The water to treat enters in the osmotic module with a determined pressure brushing the membranes. A part of the water crosses it and comes collected, with a remarkable decrease in salts and polluting substances (fresh water), in the centre of the tube.

The rest of the water with a higher salt tenor (drainage) exists from the module, after saving completely covered it.



4.2 - *Semi-permeable membranes*

- 1 Water to treat
- 2 concentrate
- 3 permeate
- 4 direction water flux to treat
- 5 direction of permeated flux
- 6 protection material
- 7 sealed cylinder head
- 8 collecting permeated holes
- 9 spacer
- 10 membrane
- 11 permeated collector



The **semi-permeable membranes**, used in the production of BAITEK Water-makers, are constructed in synthetic material with spiral structure and packed in very distinguished packaging, called **modules**. The membranes, suited for desalinate sea-water, have a salt reaction of beyond 99,4% and can operate until 40° C water temperature.

4.3 – Process Description

The SYNCHROLIGHT is a system of inverse osmosis that associates the filtering action of a system of pre-filtration (in cartridges of polypropylene) to that per-selective one of the membranes. In the first step water comes pre-filtered in order to remove solids and particles in suspension bigger than 50 micron, in the second step water comes pre-filtered in order to remove particles bigger than 5 micron. After this pre-filtration the water is sent, through a piston pump, with a much elevated pressure (60 bar), to the inside of vessel (an osmotic module) where the osmosis membrane is, which realizes a remarkable separation of dissolved salts. The system therefore removes, beyond to chloride of sodium salts, also those injurious substances presents in waters in great quantity. The osmosis membranes, when integral, is not attachable from virus or bacteria.

5.0 – TECHNICAL CHARACTERISTICS

<i>Electric requirement</i>	<i>230 Vac 50 Hz</i> <i>380 Vac 50 Hz (on request)</i>
<i>Electric Absorption</i>	<i>1,8 Kw</i>
<i>Salinity feed water</i>	<i>35.000 ppm TDS</i>
<i>Operating pressure</i>	<i>60 Bar</i>
<i>Range feed water temperature</i>	<i>3 – 45°C.</i>
<i>Pre-filtering</i>	<i>Cart. 50+5 micron</i>
<i>Automatic over pressure shutdown</i>	<i>72 bar</i>
<i>Range PH value</i>	<i>4-9</i>
<i>Chlorine tolerance</i>	<i><0,1 ppm</i>
<i>Typical salt rejection</i>	<i>99,2% 99,6%</i>
<i>Salinity of fresh water produced</i>	<i><400 ppm TDS</i>
<i>Weight</i>	<i>60 Kg</i>

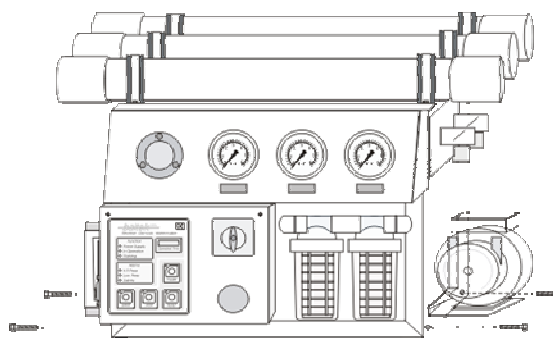
Conditions of test to 25° with salinity of the entering water of 35.000 ppm TDS (NaCl). The quantity of produced water can vary according to the salinity level and to the temperature of the entering water

6.2 - Installation

Before proceeding with the installation, locate the exact place where to install the system

Hydraulic Connections

Fix the system on a plan surface or consoles with 6 mm bolts, using the affixed holes in proximity of the rubber base. Connect the seawater inlet (connection ½" gas), located at the top right of the system, to the nearest seawater plug.



In order to avoid pre-pump suction problems, the seawater plug must not be smaller than 3/4".

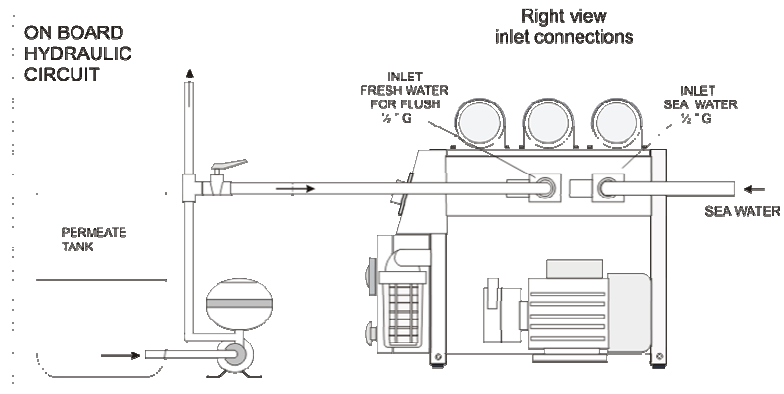
The pre-pump is self priming, the installation of a non return water valve on suction way is suggested every time the system stops.

We advise against the use of seawater plugs that are already connected to other systems.

In the case the seawater plug is located farther than 3mt, the installation of thrust pump with adequate capacity or the connection to an autoclave, located on the seawater system, are suggested.

Connect the connection for the flushing of the fresh water inlet with a 3/4" pipe.

Intercept the fresh water from the hydraulic system (delivery fresh water autoclave) and connect to the opposite connection right on the water-maker under the fresh water inlet connection.

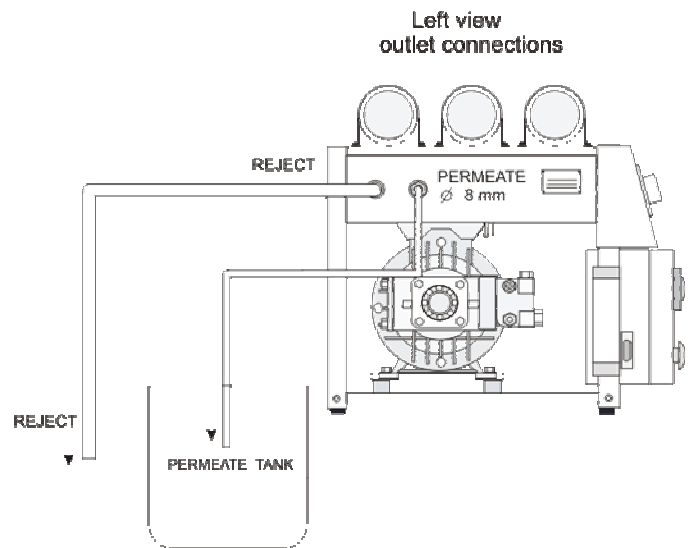


Connect the discharging connection (1/2" gas), located left to the water maker, to a discharger above the floating level line.

Therefore connect the fresh water outlet, located at the above right of the water maker (3/8" gas) to the boat tank.

ATTENTION!

Avoid throats and/or blocks in the pipe that brings the fresh water to the tank because dangerous pressures could come out and damage the system.



6.3 - Electric Connection and remote control

The machine is already equipped with a feeding cable to connect the power (12 VDC) line therefore it does not need inner connection. Check that the right electric power is available.

ATTENTION!

It is advised to insert at the bottom of the system a magneto-thermic switch of protection at 20 ampere power.

The remote control is equipped with a standard cable, 8mt long and with “D” 15 poles type connectors.

The inlet is located on the right side of the control panel, near the emergency switch, as showed in the picture (detail n.8).

7.0 - FIRST IGNITION PROCEDURE

7.1 - Ignition

Make sure that the valve of interception on the sea-water plug is opened.

Give tension to the water-maker from the magneto-thermic switch (if it has). The green led, located on the top left of the control panel, will light up in order to indicate that the system is connected (**Power Supply**).

Get the water-maker started through the **ON** lever switch located at the bottom left in the control panel, the same green led will light up in order to indicate that the system is running.

Make sure that the pre-pump (in the case has been installed) regularly inhales the water from the sea-water plug, checking that the manometer for the H.P. pipe inlet displays the working pressure in a range between 0.5 and 1 bar.

ATTENTION: all the water-makers equipped with low air pressure switch, at its first ignition, after installation, can be rigged with a "LOW PRESSURE" alarm because the air pressure switch does not sense the right pressure of the feeding water yet. Set the system again by pushing RESET button and get the system stated.

Wait for 3 - 4 minutes, in order to allow complete exit of the air from the hydraulic circuit. The system will automatically reach 60 BAR working pressure, that is displayed in the bottom left side of the manometer (**Operative Pressure**).

THE SYSTEM DOES NOT NEED ANY PRESURE SETTING

7.2 - Alarms

The system is equipped with a series of sensors that get the central unit intervene in case of system malfunctions

High Pressure alarm: in the case the working pressure raises up to the 72 bars, the system will automatically block and the red light in “**H.P. Press**” alarm section lights up.

Low Pressure alarm (optional): in the case of malfunctions in water suction lift (pressure lower then 1 BAR), the system will automatically block and the “**Low Press**”

Salinity alarm: a sensor constantly monitors the quality of the produced fresh water. The in-being alarm is displayed through the “**Salinity**” red light, when the salinity overcomes settled parameters, that switches off only when the settled parameters are

Every time you get the system started, the Salinity alarm display is restored for 20-30 seconds.

Push the big red “emergency stop” button in order to RESET the system; in this case it will act like a “RESET” BUTTON.

7.3 – Flushing and blocking

By pushing the STOP button, the system will automatically start a flushing cycle for 2 minutes; the cycle is displayed through a yellow led (**Flushing**) located on the control panel; the system will automatically stop when the flushing cycle has come to the end.

Switch off the magneto-thermic switch (if it is installed).

It is important, after each running cycle, that the system flushes with fresh water taken from the storage tank, in order to avoid a precocious membranes

ATTENTION: Do not start the flushing cycle if there is chlorine inside the The osmotic membranes would irreparably be damaged. In this case, instead of pushing the STOP button, get the system arrested by pushing the RESET button.

8.0 – EXTENDED ARREST FLUSHING

The flushing process must be carried out in order to maintain the membranes sterile in case of a long inactivity period of the water-maker. It therefore has to be carried out only in the case a machine stop is foreseen for more than a month.

Prepare a bacteriostatic solution in a box, melting gr. 100 of BIOCID 100 in 10 lt. of fresh water.

ATTENTION: Asses that the used water does not contain chlorine

- remove the pipages on the incoming of flushing fresh water and the sea-drainage pipe;
 - insert and block, with hose clamps, two fragments of rubber tube;
 - dip the opposite extremities of the tubes in the container with the bacteriostatic solution;
 - start the flushing cycle by simply pushing the **FLUSH** button.
- Carry out the same procedure 2-3 times in order to assure homogeneous distribution of the bacteriostatic solution.

9.0 - MAINTENANCE

9.1 – *Working pressure setting*

The system is equipped with an automatic valve that regulates the pressure, to setting the valve and therefore to restore the right working pressure. Remove the grey PVC cover at the bottom left of the control panel, turn the blocking hexagonal screw out with a 10mm spanner, get the system starter and then slowly set the valve with screw driver.

Block the hexagonal screw again until the right working pressure has been reached.

9.2 - *Pre-filtering*

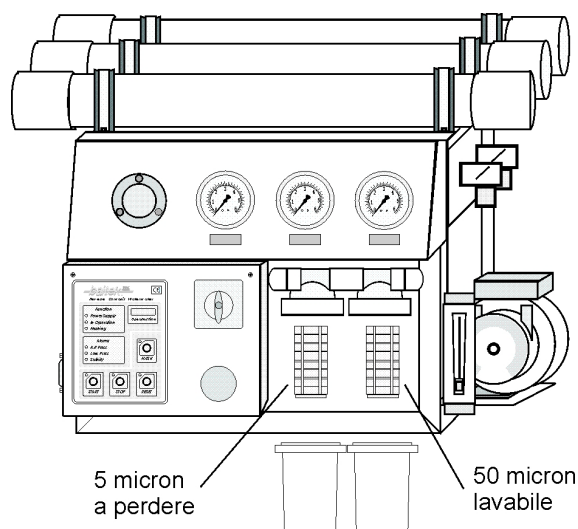
The SYNCHROLIGHT water-maker is equipped with double pre-filtering stage, the filters have filtering cartridge from 5". The first stage is composed by a washable cartridge with filtering degree at 50 micron; the second stage is composed by a "to lose" cartridge type with filtering degree at 5 micron polypropylene made.

The replacement of the filtering cartridge must be carried out every time the pressure displayed on the "Inlet Pre Filter" manometer raises up and, contemporarily, the pressure displayed on the "Inlet H.P. Pump" manometer decreases near by 0 BAR.

9.3 – *Filtering cartgidge replacing*

For replacing the filtering cartridges proceed in the following way:

- Close the interception valve located on the sea-water plug at the top of the system;
- unscrew the ring and remove the transparent vase;
- wash the transparent cases, and the 50 Micron cartridge, in running water;
- replace the 5 micron cartridge polyethylene made;
- set up again following the inverse procedure.

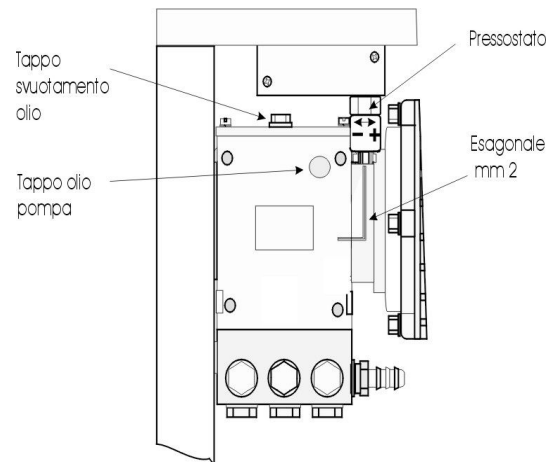


9.4 - High pressure oil pump replacing

The check of the level of the oil, contained in the Carter of the piston pump, must be periodically carried out examining the appropriate level bar, located in the back side of the pump, the oil level must correspond to the centre of the slide.

In the anomalous event of oil level decreasing, check that there are no losses. In order to empty the oil from the Carter of the pump, use the plug located at the bottom side of it (fig. 11); in case of troubles, suck the oil by a pump through the filling plug.

The oil filling must be carried out through the top plug on the carter pump (fig 11). The first oil change must be carried out after the first 50 hours of running. Subsequently it must be replace every 500 hours of running.



USE multidegree oil SAE W 40.

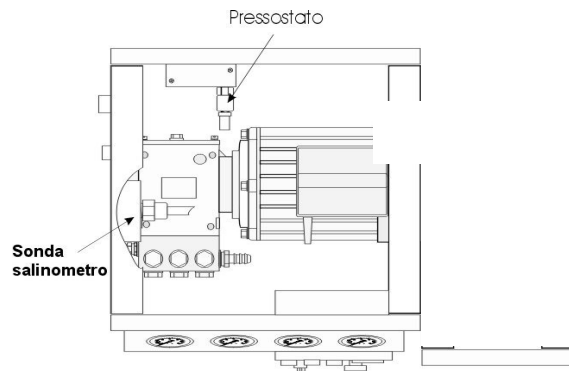
10.0 – EXCEPTIONAL MAINTENANCE

10.1 – *Setting over pressure shutdown*

The setting of the safety water pressure switch must be carried out just in case the system tends to block before reaching the working pressure (60 bars). The pressure switch is setted, while testing the system, for blocking when attaining **72 bars**.

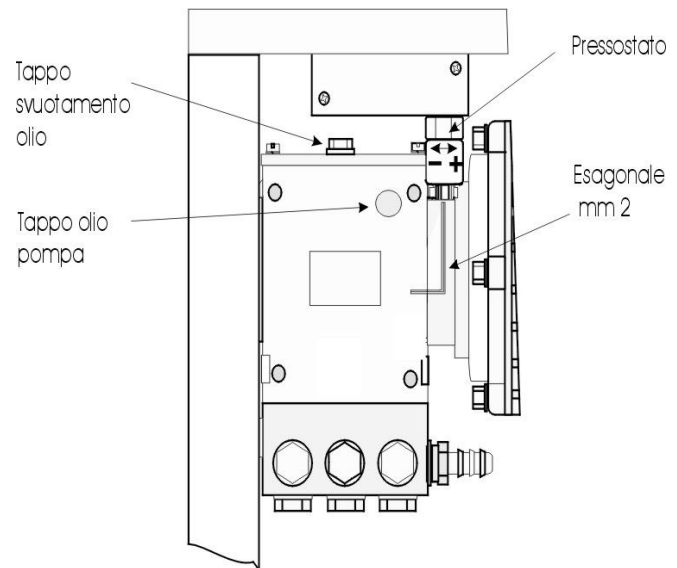
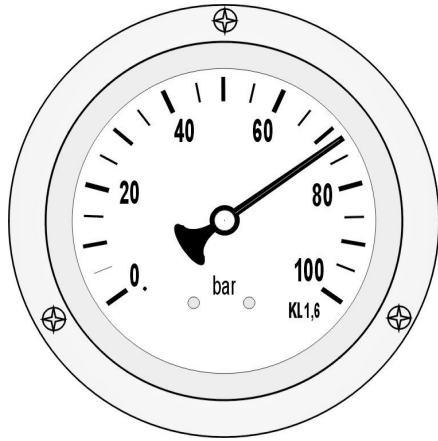
The pressure switch is located inside placed above the high pressure pump.

Remove the rubber cup in order to set the pressure switch.



Turn the water pressure switch inner screw, in clockwise sense, with a cut screw driver, and bring back the point of intervention to the original setting.

The system will block when reaching **72 bar** pressure, displayed on the manometer of the working pressure as "**Operating Pressure**".



10.2 – Salinometer probe cleaning

The salinometer probe is located left inside the system, near the fresh water outlet connection. The salinometer probe cleaning, that is just an exceptional maintenance, must be carried out only to prevent an incidental incorrect reading of the water salinity.

- Disconnect the system from the power net and make sure that the power led is switched off;
- Unscrew the two screws that block the salinometer probe and pull it out;
- Clean the electrodes with a tiny brush until all the sediments are brushed away;
- Put the probe in its original location and connect the power net that is displayed with the proper green led.

